Extend segment routing for another source routing protocol named RPL for Linux

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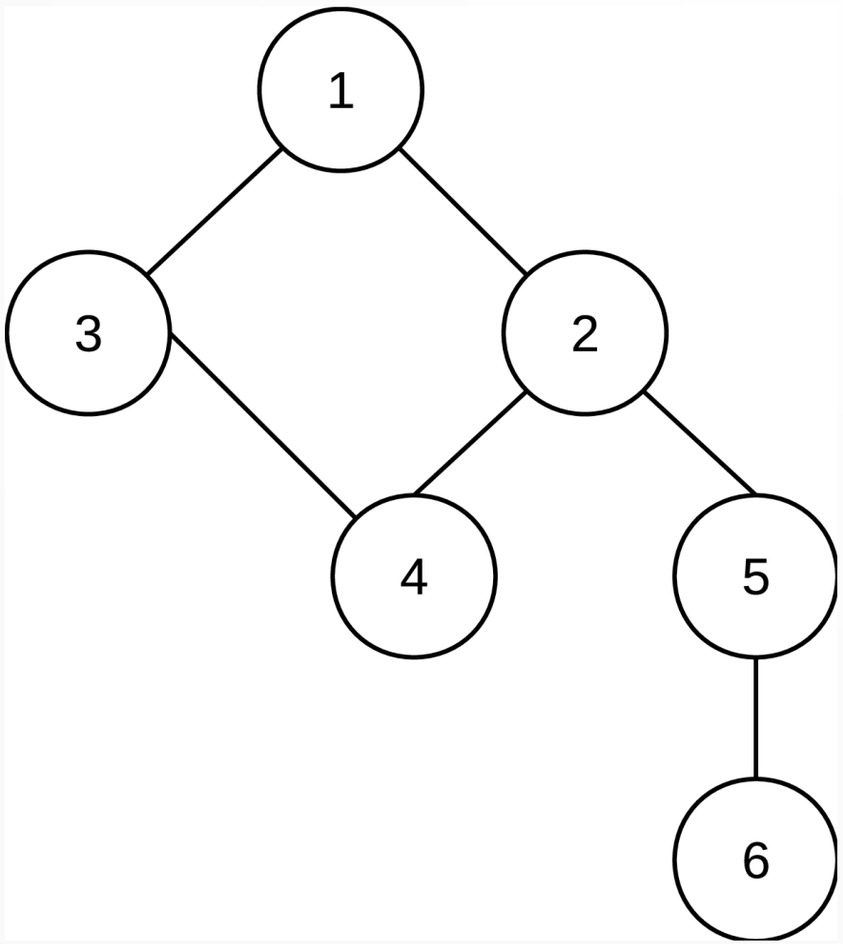
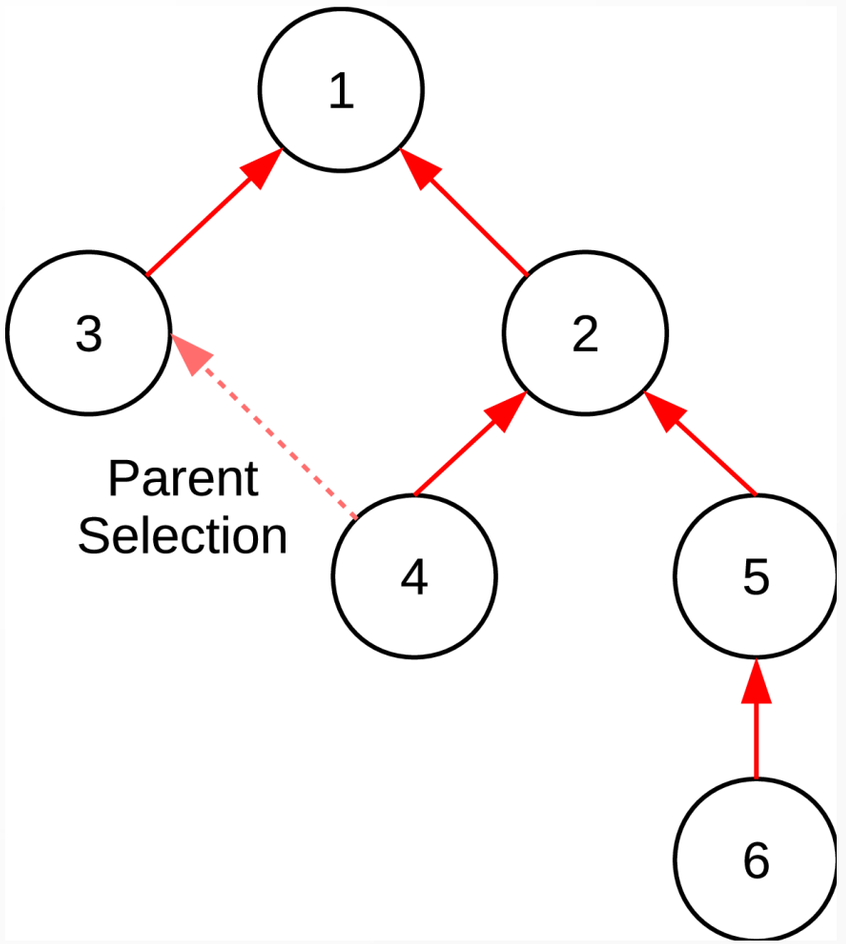
What's RPL?

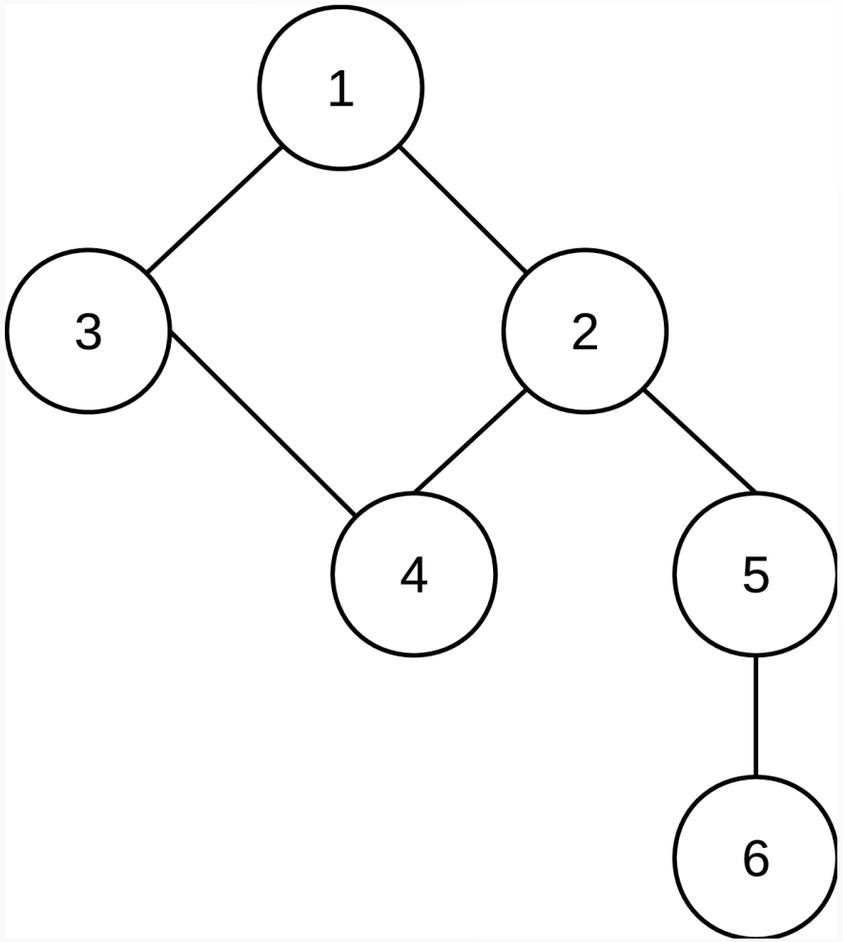
- IETF Routing Protocol – ROLL WG
- Simplification of the routing protocol
  - Tree like Topology in a mesh
    - Root node
    - Nodes have one parents
    - Nodes can have n-childs
  - Out of scope
    - Self-healing
    - Floating root nodes
    - Security, alot of more...

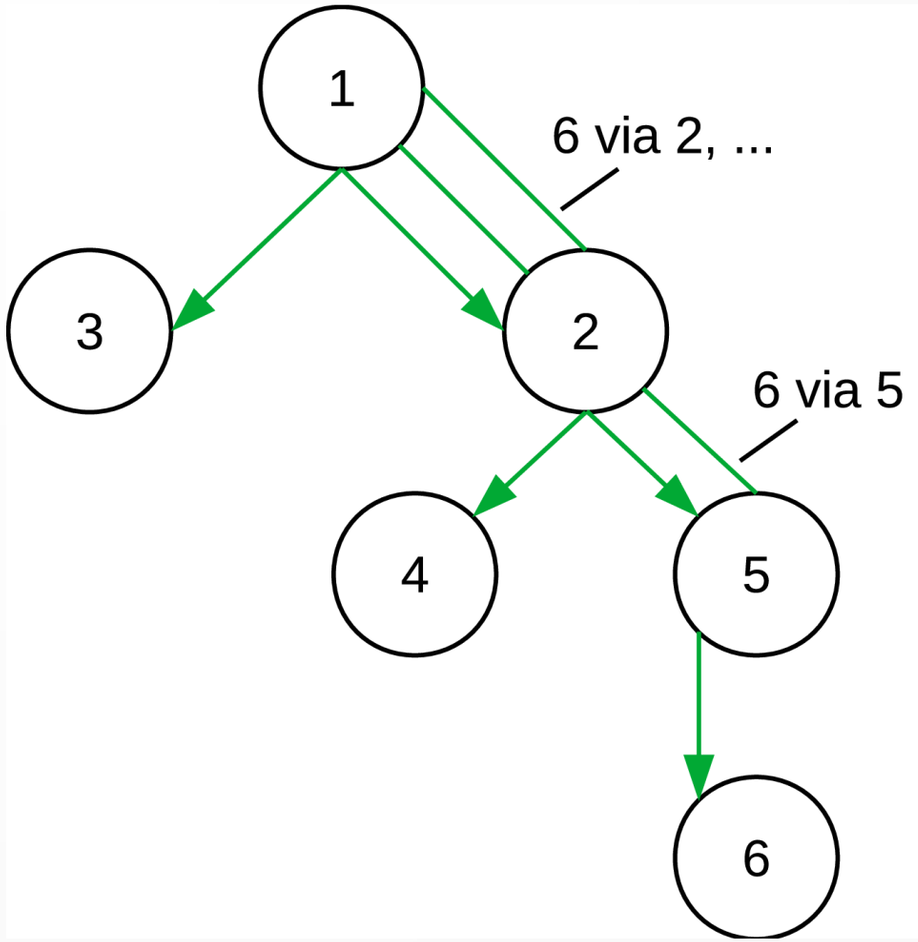
Upward Routes
storing and non-storing mode



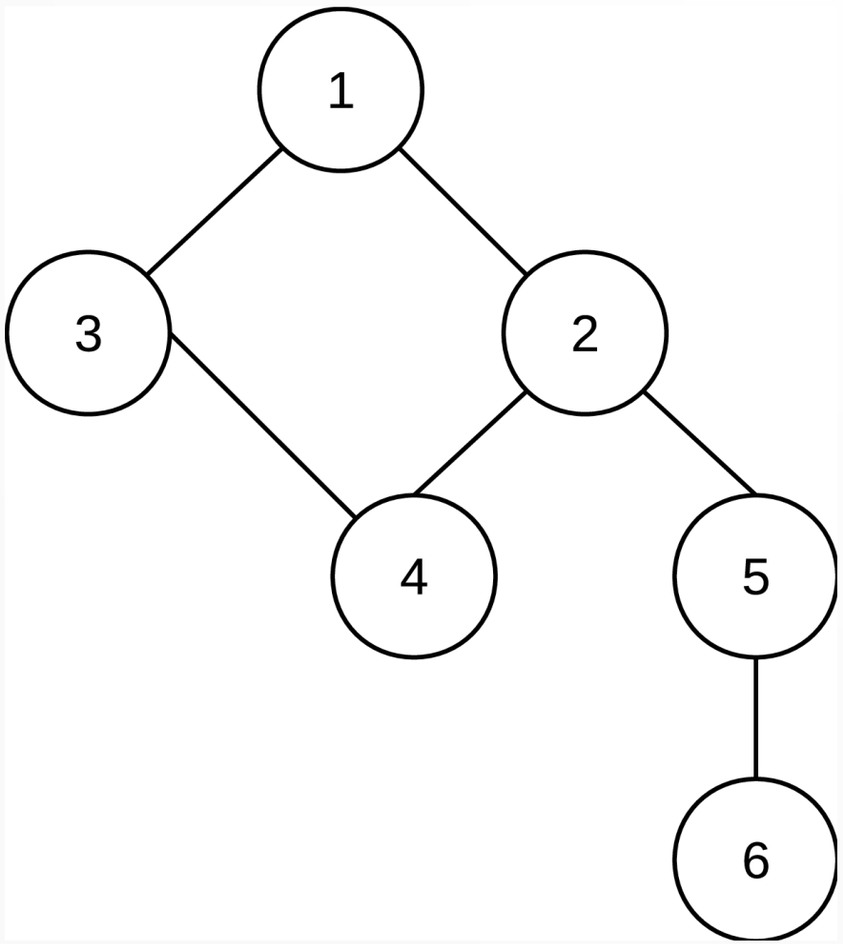


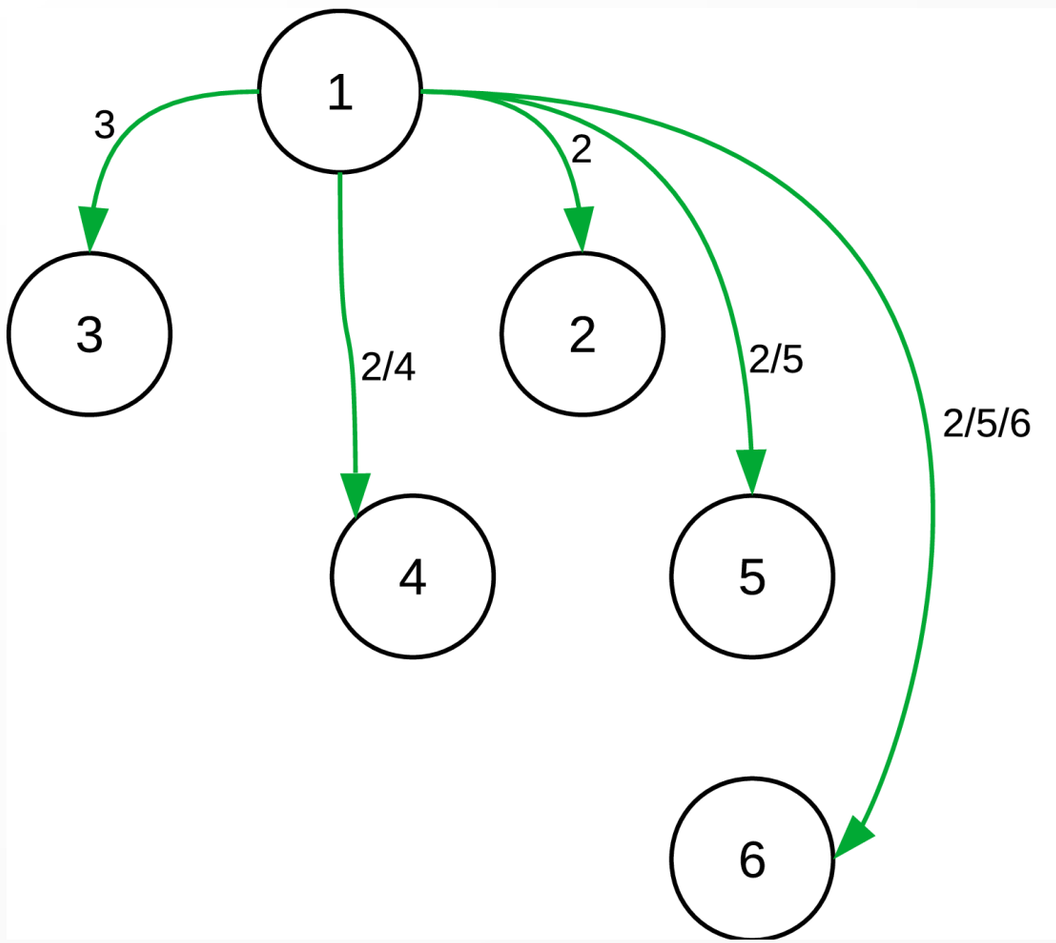
Downward Routes storing mode



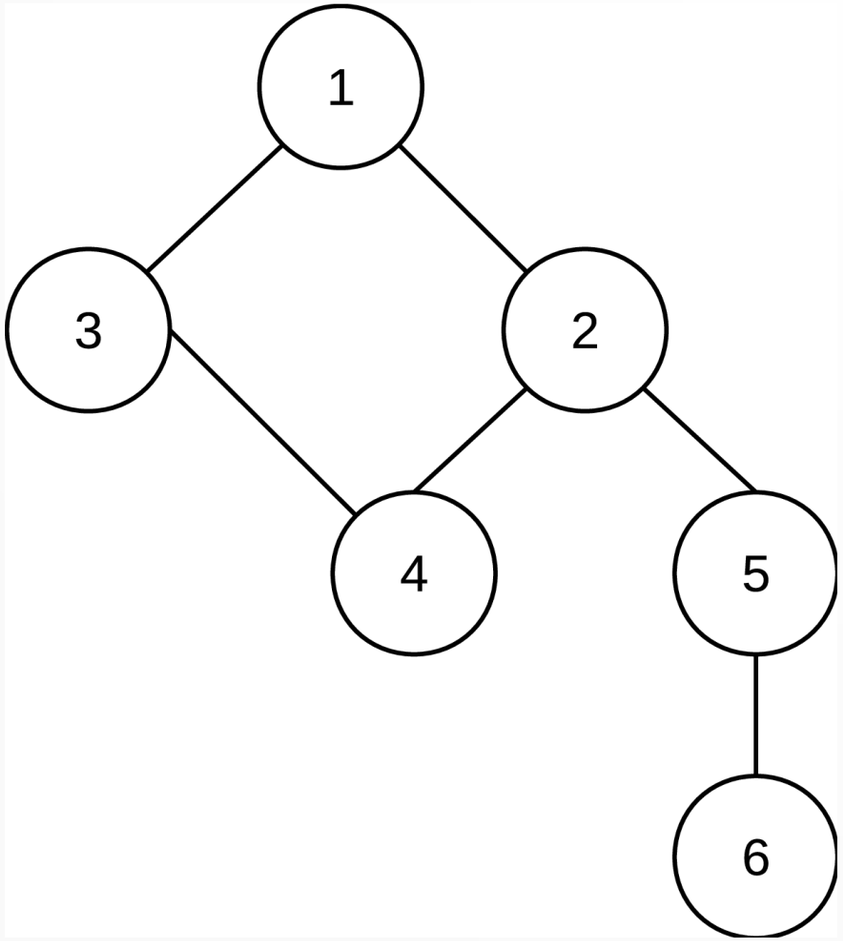


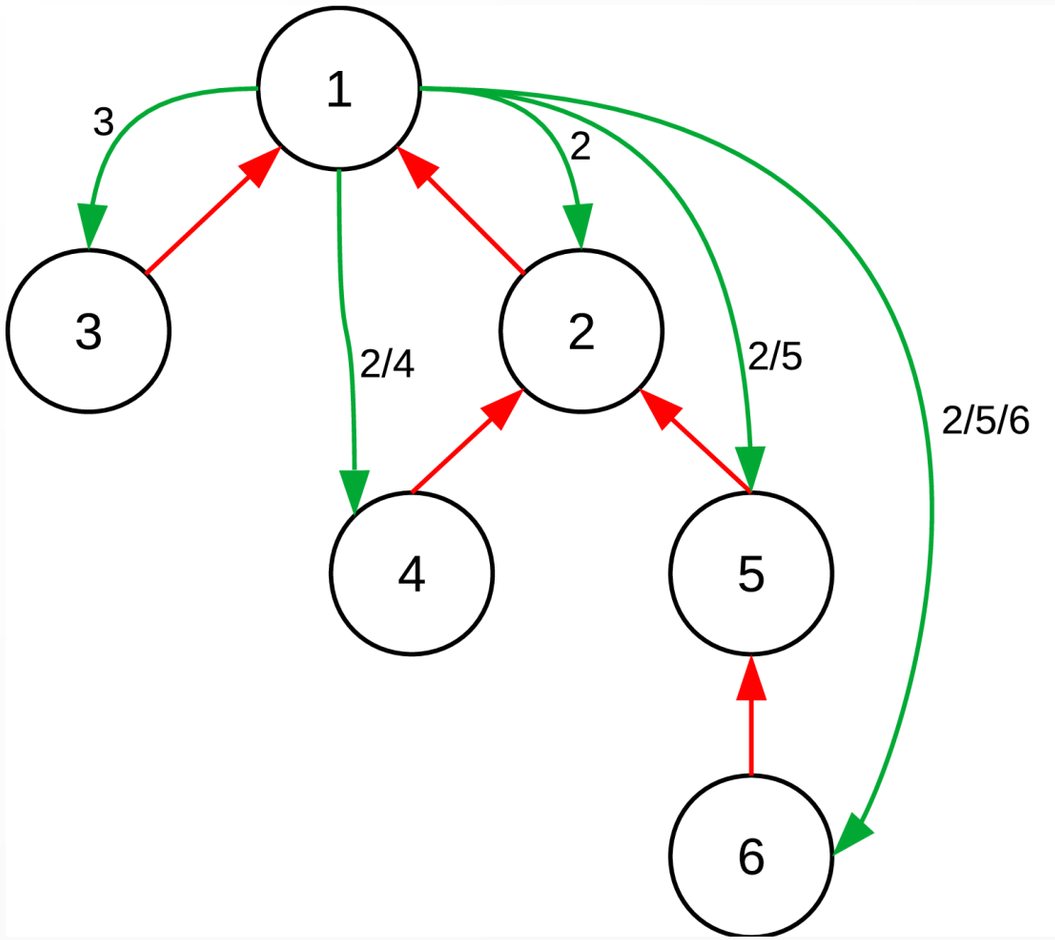
Downward Routes non-storing





Downward and Upward Routes non-storing





RPL - Segment Routing

- Root Node inserts SR extension header
- Forwarding
  - Address swapping
  - Loop detection
- Compression
  - Addresses inside the Segment Array
  - According to destination address

Implementation

- Lightweight Tunnel (net/ipv6/rpl_iptunnel.c)
  - Like IPv6 Segment Routing (the other SR)
    - Per route prefix and adding source routing header
    - Cannot setup IP encapsulation yet
  - Config: IPV6_RPL_LWTUNNEL
- Forwarding (net/ipv6/exthdrs.c)
  - Always build into IPv6
  - Can be enabled via sysfs
- Compression Helpers (net/ipv6/rpl.c)

rpld

- Experimental user space Daemon
- Exchange ICMPv6 message
- Tree implementation to represent topology
- Non-storing mode operation
  1) Creating Upward Routes
  2) Nodes report Parent and Own address to Root Node
  3) Root Node setup RPL source routing entries

DEMO

Future Work